

Date: Thursday, 02/10/2008 8:47:39 AM
 User: Julie Lecocq

Process Sheet

Customer	: CU-DAR001 Dart Helicopters Services	Drawing Name	: X-TUBE AS 350/355 HI FWD
Job Number	: 42399		
Estimate Number	: 13224		
P.O. Number	:	Part Number	: D350748141TRN
This Issue	: 02/10/2008	S.O. No.	:
Prsht Rev.	: NC	Drawing Number	: D350-748-141 REV D
First Issue	: //	Project Number	: N/A
Previous Run	: 42398	Drawing Revision	: D
	Type : CROSSTUBES	Material	:
Written By	:	Due Date	: 09/10/2008
Checked & Approved By	: <u>JUL 08.10.08</u>	Qty:	1
Comment	Est Rev A New Issue 08-03-06 DD verified by: ec Est Rev B Removed polish 08.04.02 EC verified by: DD Est Rev C Remove LPS-3 08.06.23 EC verified by DD		

Additional Product

Job Number:



Seq. #:	Machine Or Operation:	Description :
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1.0	D6017115	Crosstube Material
-----	----------	--------------------



Comment: Qty.: 1.0000 Each(s)/Unit Total: 1.0000 Each(s)
 Crosstube Material
 D6017-115
 2.339" OD X 2.000" ID
 Batch: B27421

am 08.10.08

2.0	MORI SEIKI	MORI SEIKI CNC LATHE LARGE
-----	------------	----------------------------



Comment: MORI SEIKI CNC LATHE LARGE

1-Fill tube with sand & install plugs on both ends as per Folio FA648

2-Turn first side as per Folio FA648

3- File transition lines smooth.

am 08.10.08

3.0	QC1	INSPECT ALL DIM TO DIM SHEET
-----	-----	------------------------------



Comment: INSPECT ALL DIM TO DIM SHEET

am 08.10.08

4.0	MORI SEIKI	MORI SEIKI CNC LATHE LARGE
-----	------------	----------------------------



Comment: MORI SEIKI CNC LATHE LARGE

1-Turn second side as per Folio FA648

2- File transition lines smooth.

am 08.10.08

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Thursday, 02/10/2008 8:47:39 AM
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Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE AS 350/355 HI FWD

Job Number: 42399

Part Number: D350748141TRN

Job Number:



Seq. #: Machine Or Operation: Description :

3-Scribe Part & Batch as per Dwg D350-748-141

Q.m 08.10.08

5.0

QC1

INSPECT ALL DIM TO DIM SHEET



Comment: INSPECT ALL DIM TO DIM SHEET

Q.m 08.10.08

6.0

QC8

SECOND CHECK



AWM 8-10-09



Comment: SECOND CHECK

7.0

LARGE FAB 1

LARGE FABRICATION RESOURCE 1



AWM 8-10-09



Comment: LARGE FABRICATION RESOURCE 1

Grind machining marks

8.0

OUTSIDE SERV.11

OUTSIDE SERVICE -CROSSTUBES



Comment: Sub-Contracting OUTSIDE SERVICES

Issue P/O: *7391*

08/10/17

Heat Treat to min 180 KSI As per Dwg D350-748-141

(MIL-T-6736 OR AMS 2759-1C)

Sand Blast tube after Heat Treat

Possible Supplier: Vac Aero

Ensure Certificate of Conformity is attached

9.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Receive & Inspect For Transit Damage

Ensure certificate of conformaty is attached

SS 08/11/17

10.0

QC6

DIMENSIONAL CHECK



Comment: DIMENSIONAL CHECK

SS 08/11/17

11.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Oil inside of tube with LPS-3 .

A/R LPS-3 Batch: *u/a*

SS 08/11/17

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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Date: Thursday, 02/10/2008 8:47:39 AM
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Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE AS 350/355 HI FWD

Job Number: 42399

Part Number: D350748141TRN

Job Number:



Seq. #:

Machine Or Operation:

Description :

12.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and stock in kanban rack

Location:

Back Hall

DP

8-11-17

13.0

QC21

FINAL INSPECTION/W/O RELEASE



08/11/18

Comment: FINAL INSPECTION/W/O RELEASE

Job Completion



MF 08-11-18

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order: 42899
Description: Crosstube Assembly (AS350/355 High Fwd)	Part Number: D350-748-141
Inspection Dwg: D350-748-141 Rev: D	Page 1 of 1

FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article ☐ Prototype

Inspection Sheet	Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.240	+0.005/-0.000	2.245	/			
	2.180	+0.005/-0.000	2.185	/			
	2.180	+0.005/-0.000	2.185	/			
	2.237	+0.005/-0.000	2.242	/			
	2.272	+0.005/-0.000	2.275	/			
	2.306	+0.005/-0.000	2.308	/			
	2.339	+0.005/-0.000	2.339	/			
	2.339	+0.005/-0.000	2.339	/			
	0.062	+/-0.010	0.062	/			
	4.26	+/-0.030	4.260	/			
	R0.063	+/-0.010	R0.063	/			
	R0.50	+/-0.030	R0.500	/			
SIDE B	2.240	+0.005/-0.000	2.245	/			
	2.180	+0.005/-0.000	2.185	/			
	2.180	+0.005/-0.000	2.185	/			
	2.237	+0.005/-0.000	2.242	/			
	2.272	+0.005/-0.000	2.275	/			
	2.306	+0.005/-0.000	2.308	/			
	2.339	+0.005/-0.000	2.339	/			
	2.339	+0.005/-0.000	2.339	/			
	0.062	+/-0.010	0.062	/			
	4.26	+/-0.030	4.260	/			
	R0.063	+/-0.010	R0.063	/			
	R0.50	+/-0.030	R0.500	/			
	110.27	+/-0.060	110.270	/			

Measured by: a.m	Audited by: AWM	Prototype Approval: N/A
Date: 08.10.08	Date: 8-10-08	Date: N/A

Rev	Date	Change	Revised by	Approved
A	06.11.09	New Issue (P/O D350-748-101)	KJ/JLM	
B	07.10.24	Dwg Rev updated	KJ/EC/DD	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART**RELEASED**

06.10.31

DESIGN QP	DRAWN BY QP	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED H	APPROVED H	DRAWING NO. D350-748-141	REV. D SHEET 1 OF 3
DATE 06.10.31		TITLE CROSSTUBE (AS 350/355 HI FWD)	SCALE NTS
A	06.03.31	NEW ISSUE	
B	06.06.30	ADD D6017-115 & PRIME AND PAINT	
C	06.08.14	ADD CAD PLATING	
D	06.10.31	MAG. PARTICLE AND CAD PLATE AS MFD.	

QTY	P/N	DESCRIPTION
X	D350-748-141	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
1	D6017-115	CROSSTUBE (OR D6015-125)
2	D3502-1	SUPPORT
2	D2856-400-710	ABRASION STRIP
1	AELS-1032-225	INSERT
1	AN960JD10	WASHER
2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
1	MS27039-1-10	SCREW

D350-748-141 CROSSTUBE:

- 1) MATERIAL: MANUFACTURED FROM D6017-115 OR D6015-125
FINISHED LENGTH = 110.27 ± 0.06
- 2) MACHINE PER MACHINING DETAIL ON PAGE 3. BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITIONS SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 3) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 4) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 5) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING
- 6) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 7) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
- 8) INSTALL D2856-400-710 ABRASION STRIP WITH A GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 9) TORQUE MS21920-20 CLAMPS 60 TO 80 IN-LB
- 10) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 11) ALL DIMENSIONS ARE IN INCHES
- 12) PART IS SYMMETRIC ABOUT CENTERLINE EXCEPT FOR $\varnothing 0.297$ HOLE.

UNCONTROLLED COPY
RETURN TO
ENGINEERING
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER

UNDER REVIEW

07.02.16

CUFF BENCH REVIEWED
OK 07.07.22

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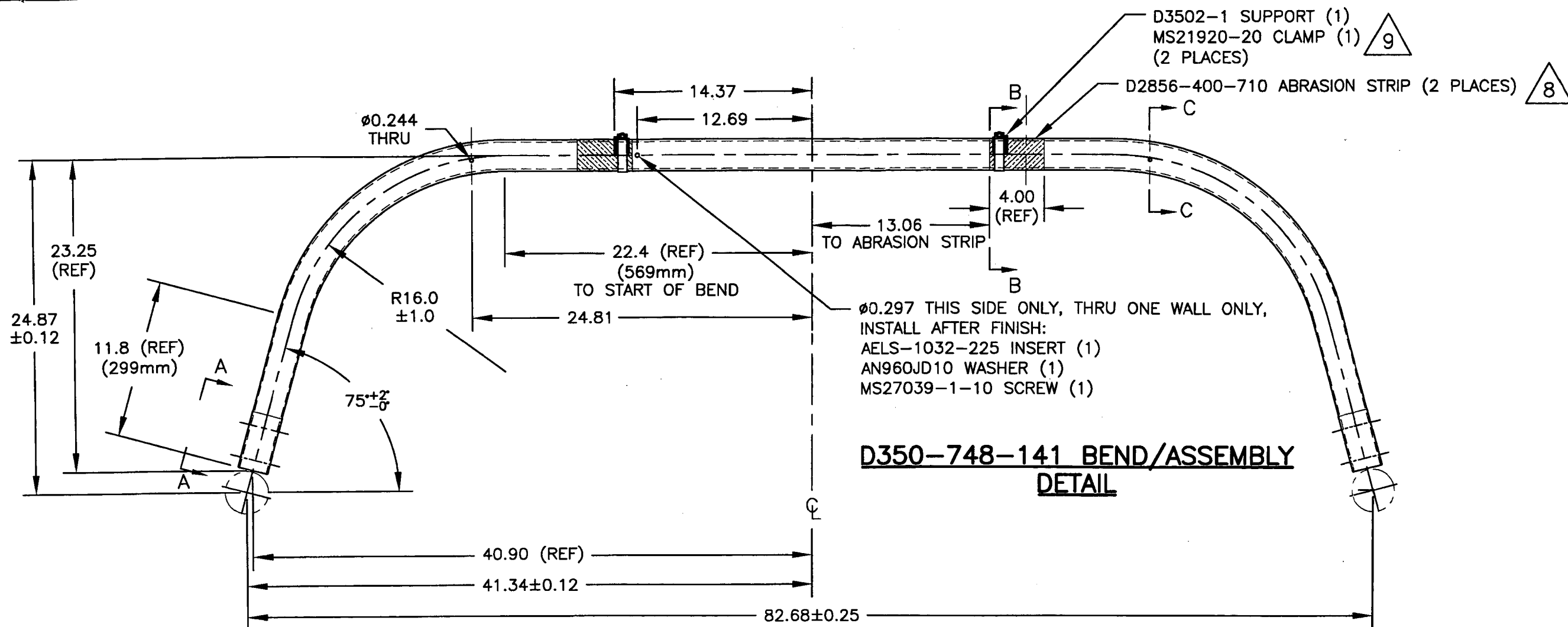
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

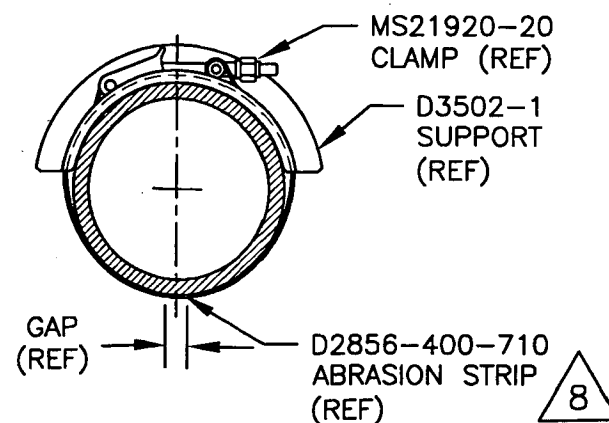
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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

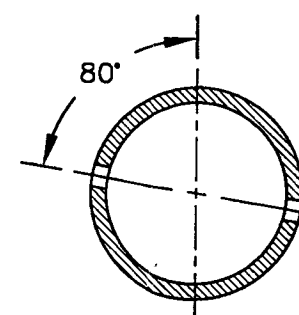
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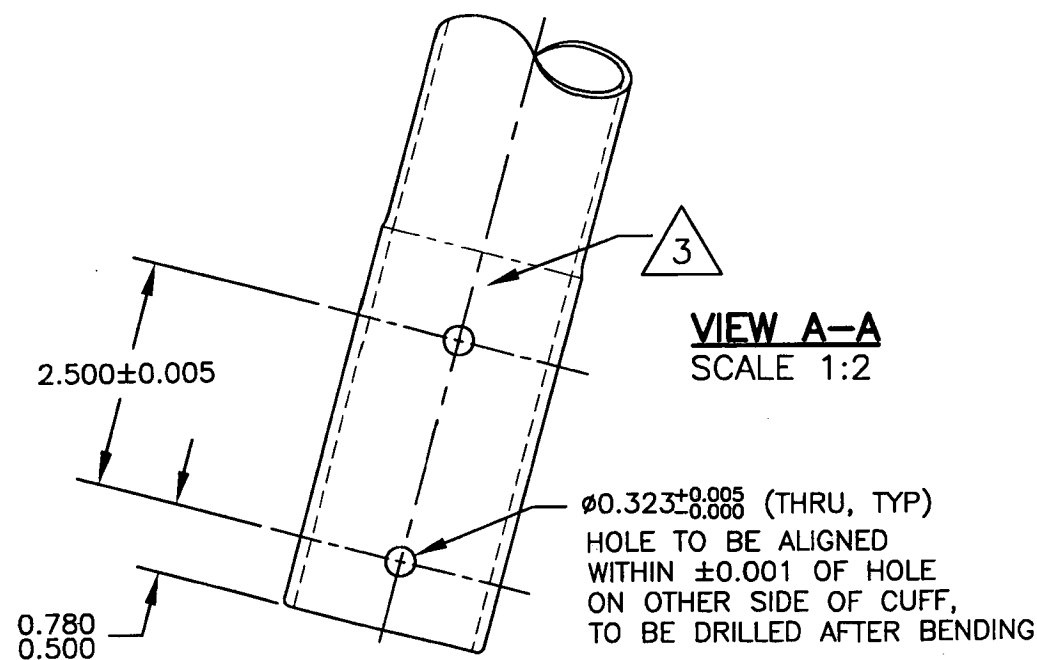
SECTION B-B
SCALE 1:2



SECTION C-C
SCALE 1:2



VIEW A-A
SCALE 1:2



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NO. 4239

UNDER REVIEW

07.02/16/17
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Ø 0.7.11.22

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06.10.31

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90

DRAWN BY

90

DART

DART AEROSPACE LTD.
HAWKESBURY, ONTARIO, CANADA

CHECKED

11

APPROVED

11

DRAWING NO.
D350-748-141

REV. D
SHEET 2 OF 3

DATE

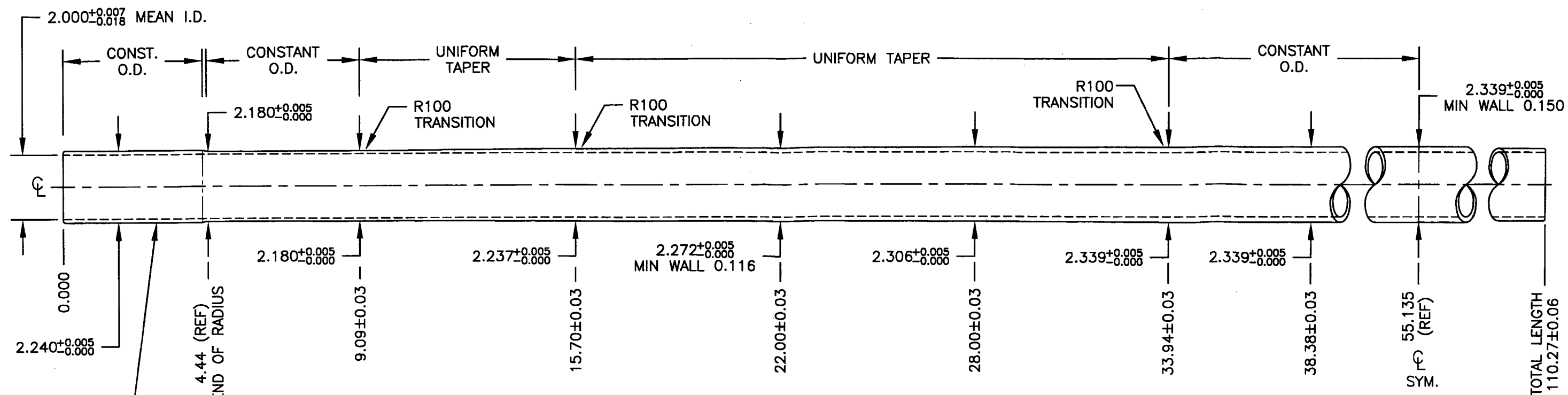
06.10.31

TITLE

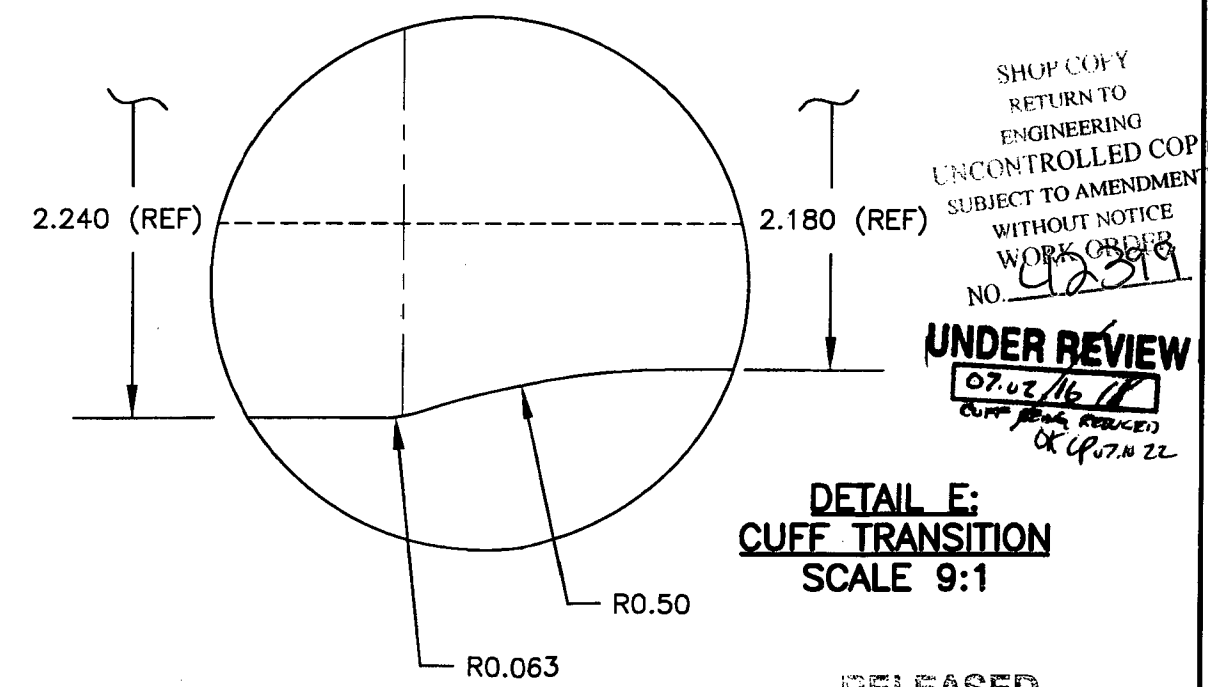
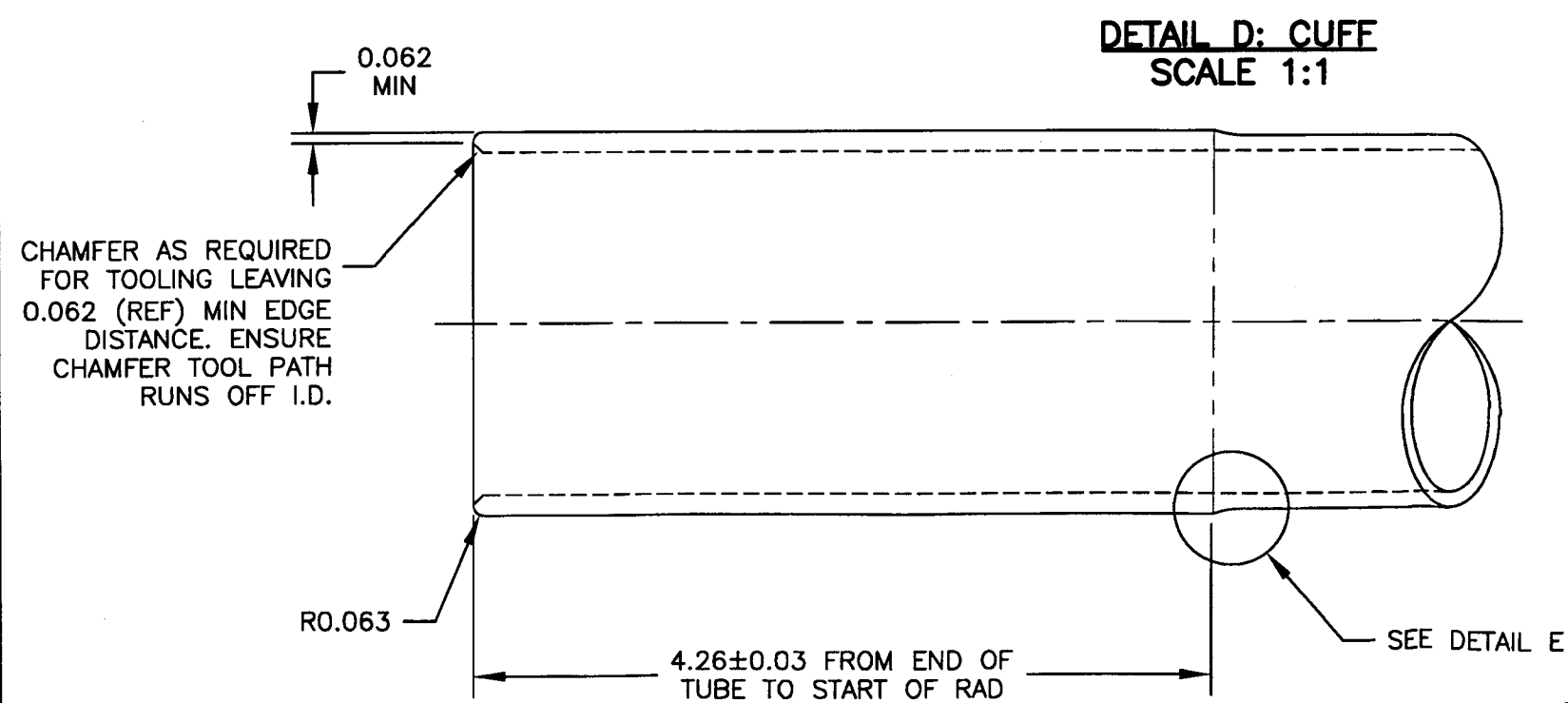
CROSSTUBE (AS 350/355 HI FWD)

SCALE

1:8



D350-748-141 MACHINING DETAIL



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SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 42319

UNDER REVIEW
07.07.16
CUFF TRANSITION
07.07.16

**DETAIL E:
CUFF TRANSITION
SCALE 9:1**

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06.10.31

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		DATE		DRAWING NO.	REV. D
		06.10.31		D350-748-141	SHEET 3 OF 3
				TITLE	SCALE
				CROSSTUBE (AS 350/355 HI FWD)	1:3



VAC AERO
INTERNATIONAL INC.

RELEASE NOTE

GST No.: R105468102

OAK 103759-1

☒ HEAD OFFICE
1371 SPEERS ROAD, OAKVILLE, ONTARIO
CANADA L6L 2X5
TEL: (905) 827-4171 FAX: (905) 827-7489

☐ 2009 WYECROFT ROAD, UNIT B
OAKVILLE, ONTARIO
CANADA L6L 6J4
TEL: (905) 827-7377 FAX: (905) 827-1380

☐ QUEBEC DIVISION
7450 RUE VÉRITÉ STREET, ST. LAURENT, QUÉBEC
CANADA H4S 1C5
TEL: (514) 334-4240 FAX: (514) 334-6269

11/14/2008

MM / DD / YYYY

PAGE: 1


BILL TO: 1DAR01
DART AEROSPACE LTD.
1270 ABERDEEN ST.
HAWKESBURY, ON

SHIP TO: DART AEROSPACE LTD.
1270 ABERDEEN ST.
HAWKESBURY, ON

K6A 1K7

K6A 1K7

DATE SHIPPED	SHIP VIA	F.O.B.
11/14/2008		ORIGIN
CUSTOMER P/O No.	JOB No.	TERMS
PO00007391		NET 30 DAYS

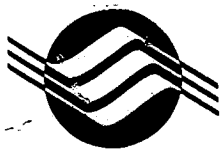
PART No.	DESCRIPTION	UOM	QTY ORD	QTY SHPD	TEST RESULTS
D350-748	-141	EA	10	10	
<p>Process Specifications: Procedure: 4353 HEAT TREATED TO 180 KSI MIN. PER AMS 2759-1D 100% HARDNESS TESTED AS PER ASTM E-18, 40-45 HRC GRIT BLASTED MATERIAL: 4130</p> <p>S/N B42396 THRU B42405 NOTE: NO SERIAL NUMBERS FOUND ON PARTS</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"><p>100% HARDNESS TESTED</p><p>10 pcs. 41/42 HRC</p></div> <div style="display: flex; justify-content: space-between; margin-top: 20px;"><div><p><i>JS 08/11/17</i></p></div><div><p><i>S 08/11/17</i></p></div><div><p><i>JR</i> </p></div></div>					

I hereby certify that the material covered by this release note has been inspected and tested and conforms to all specifications relevant thereto in accordance with the conditions of the contract / or purchase order.

ON BEHALF OF VAC AERO INTERNATIONAL INC.

Gaura Robinson
Authorized Q.C. Inspector





VAC AERO
INTERNATIONAL INC.

PACKING SLIP

OAK 103759-1



HEAD OFFICE

1371 SPEERS ROAD, OAKVILLE, ONTARIO
CANADA L6L 2X5
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QUEBEC DIVISION

7450 RUE VÉRITÉ STREET, ST. LAURENT, QUÉBEC
CANADA H4S 1C5
TEL: (514) 334-4240 FAX: (514) 334-6269

GST No.: R105468102

11/14/2008

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PAGE: 1

1DAR01

BILL TO: DART AEROSPACE LTD.
1270 ABERDEEN ST.
HAWKESBURY, ON

SHIP TO: DART AEROSPACE LTD.
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HAWKESBURY, ON

K6A 1K7

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DATE SHIPPED	SHIP VIA	F.O.B.
11/14/2008		ORIGIN
CUSTOMER P/O No.	JOB No.	TERMS
PO00007391		NET 30 DAYS

LN	PART NO	DESCRIPTION	UOM	QTY ORDERED	QTY SHIPPED	B/O QTY
01	D350-748 -141	Process Specifications: Procedure: 4353 HEAT TREATED TO 180 KSI MIN. PER AMS 2759-1D 100% HARDNESS TESTED AS PER ASTM E-18, 40-45 HRC GRIT BLASTED MATERIAL: 4130 S/N B42396 THRU B42405 NOTE: NO SERIAL NUMBERS FOUND ON PARTS	EA	10	10	0
02	MC	MINIMUM CHARGE (RUN WITH 103192)		1	1	0

No claims for shortage in weight or count will be entertained, unless presented within 5 working days after receipt of materials by customer.



VACUUM BRAZING · HEAT TREATING · SPECIAL PROCESSING · FURNACE EQUIPMENT
TURBINE COMPONENT OVERHAUL · PLASMA AND OTHER COATINGS



HEAT
TREATING